ENHANCING QUALITY AND EFFECTIVE COMPUTER PRACTICAL IN SENIOR SECONDARY SCHOOLS IN SOUTH-EAST NIGERIA

BY

UKWAH, CHRISTOPHER NWAMBAM
***D*EPARTMENT OF COMPUTER SCIENCE**
EBONYI STATE COLLEGE OF EDUCATION, IKWO
E-mail: *christopherukwah@gmail.com*

Abstract

The study was carried out to identify the measures of enhancing quality and effective practical in the training of computer science study students in secondary schools in South-East Nigeria for job skills acquisition. Two null hypothesis were formulated and tested at 0.05 level of significance in line for purpose of the study. Literature was organized under conceptual framework, theoretical framework, empirical studies and summary of the review of literature. The study adopted descriptive survey design. Population of the study is 1366, and the sample comprised (200) public senior secondary school teachers from the area of the study drawn using multi-staged sample technique. An instrument termed "Computer Science Study Practical Questionnaire (CSSPQ)" was used for data collection. Three experts validated the instrument and reliability was determined using Cronbach Alpha Statistics with reliability arriving at 0.92. Mean and standard deviation was used for the research questions while t-test statistics used for testing the null hypothesis. Findings revealed that items presented are institutional and socio-economic factors affecting quality and effective practical in senior secondary schools computer science study in South-East, Nigeria. Hypothesis test revealed that there was no significant difference in the mean response of teachers of computer science and ICT from Ebonyi and Enugu states. Recommendations was that government and none governmental organizations should assist in the provision of the require facilities and structures.

Key words: Computer practical, Algorithm formulation, Socio-Economic Factor, Multi-Staged Technique.

Background to the Study

Computer Science is an active, practically-oriented subject and its concepts find applications in our everyday life. According to Stanford Encyclopedia of Philosophy (2021), states that the philosophy of computer science considers the ontology and epistemology of computational systems, focusing on problems associated with their specification, programming, implementation, verification and testing. Noted is the fact that computer science is the most applied

computational science because its principles and implementation supply the foundation of other computational scientific fields and other areas of study. In a related development, Allan Tucker (2022) described computer science as the study of computers and computing as well as their theoretical and practical application. Two major reasons for studying computer were equally identified to include, firstly, computer is the most fundamentally applied science, and scientists of all disciplines make use of ideas of computation from mathematics which is the science and study of quality, structure, space, and change. Furthermore, Young and Freedman (2003) noted that computer science is also the foundation of all engineering and technology modelling, as no engineer could design any kind of practical device without first understanding the basic physical principles involved. As well as logic to a plethora of functions including algorithm formulation, software and hardware development and artificial intelligence.

The second reason adduced by Andreou, Nicou, Polycarpuo and Germanakos (2017) is that the study of computer science is an adventure "among the most fundamental concepts in education is introductory programming, and many effective approaches were proposed to teach programming to novice learners. This realization is evidenced in the National Policy on Education (FRN, 2004), where it is emphasized that, the overall philosophy of education in Nigeria among others should be directed to building a united, strong and self-reliant nation by educational activities being geared towards scientific and technological progress. In the developing world, educational policy are faced with a major task, how to create chances of success for all children and their citizens as a whole. It is essential to overcome the problem of illiteracy, school failure and to improve the intellectual capabilities of students. However, education is the process of teaching, training and learning especially in schools and colleges to improve knowledge and develop skill. Accordingly, this is noted that the study of areas of computer science is challenging, sometimes frustrating, occasionally painful, and often richly rewarding and satisfying.

Computer science is the study of computers and algorithm processes, including their principles, their hardware and software designs, their applications, and their impact on society, Tucker, A. et al, (2006). Practical ability is the essential requirement for computer science student ability, structure, and it emphasizes that computer science students should have a good of theory from practice and then apply the theory to practice, improving their own software development skill and employability. It plays a central role in many different sectors of industry such as telecommunications, health, architecture, engineering, production, construction, and transport, etc. It also provides employment for people who are in occupations that are engaged in computer science as a scientific discipline - for example teachers, scholars, and other researchers. It is thus an indispensable part of any country's economic development. Furthermore, computer science often provides the foundational application for other disciplines such as biology, medicine, chemistry and others. It enables learners to develop application and analytical skills necessary for problem solving in various situations they encounter in life. All technology is beholden to computer due to its emphasis on addressing phenomena involving the interaction of identified problems and its solution. Medical methods including imaging

techniques (CT-scanning, X-rays, MRI techniques, ultra-sound echo techniques, and diagnostic patient screening techniques (Freeman, 2012) are based on computing principles. Currently, a wide variety of treatment techniques made possible by the discovery of radioactivity and other high frequency radiations exist. The unravelling of the DNA structure and the subsequent genome project required a significant input from computing techniques (Stanley, 2000). Continuing research into challenges posed by diseases such as cancer, Ebola, HIV/AIDS, and Covid will require the development of high precision equipment employing computing principles. The current fixation with information communication technologies (ICTs) could not have occurred without the primal electronic technologic discovery of the transistor. Computers, mobile phones and their attendant spin-off technologies show the indispensability of computing science application. Electromagnetism is vital in the generation of electricity, mobile phone communication, optical and satellite communication, portable electronics, radio and radar perception, and X-ray crystallography (Campbell, 2006). For these and many more reasons computing is a major requirement for studying all science and engineering related courses in universities, polytechnics and colleges.

In South-East Nigeria precisely, few students choose to pursue the subject during the last two years of secondary school (Onah and Ugwu, 2010). Strategically, the demand for computer science should be growing due to its strong influence on technology programs at university and other tertiary institutions of learning. The low engagement in senior secondary school computer practical has been linked to a shortage of inspirational and well trained computer teachers, inadequate laboratory facilities and the accompanying limited exposure to practical instruction at junior secondary school level (Daramola, 1987). The computer science teachers are mainly trained in theoretical content aspects. Training in handling computer practical lessons has been ineffective in many developing countries including Nigeria. Training in conducting school type science experiments is completely ignored in many university teacher training curricula. Many of all the Nigerian university trained bachelor of education (science) graduates lack the skills of handling high school type of practical work. There are no school-type laboratories set aside for this exercise in the various universities, polytechnics and colleges that train teachers (Masiagila & Gathumbi, 2012). Being a practical based science subject, effectiveness of teaching computer science should be judged by the kind of practical activities that teachers and students are engaged. The consequence is that the computer teachers lack the skills for effectively guiding learners in conducting laboratory work. The attendance advantages of performing practical work are lost on the learners. Practical work may be considered as engaging the learner in observing or manipulating real or virtual objects and materials (Millar, 2004). Appropriate practical work enhances students' experience, understanding, skills and enjoyment of science. Practical work enables the students to think and act in a scientific manner. The scientific method is thus emphasized. Practical work induces scientific attitudes, develops problem solving skills and improves conceptual understanding (Tamir, 1991). Practical work in computer helps develop familiarity with problem solving approaches, electronic devices handling ethics, instruments and equipment. Manipulative skills are acquired by the learners. Expertise is developed for reading all manner of ICT manipulation,

programming and hardware used cases. The observations made and results obtained are used to gain understanding of computing concepts. Practical work creates motivation and interest for learning the subject. Students tend to learn better in activity based courses where they can manipulate equipment and apparatus to gain insight in the content. Millar (2004) has suggested that practical work should be viewed as the mechanism by which "materials and equipment are carefully and critically brought together to persuade the computer science learner about the veracity and validity of the scientific and technological world view. If practiced in the right manner from the early secondary school period, critical thinking skills can be attained from practical work in computer science and its ancillaries ICT areas.

Practical work puts the students at the center of learning where they can participate in, rather be told about computer science and ICT. In this way the quest, desires and eagerness to know more about what the subject can offer is developed. However, the reality on the ground is that most practical works are sterile, un-illuminating exercises whose purpose is often lost on the learners. (Hodson, 1991) observed that practical work/experiment is ill conceived, confused and unproductive in many schools. Whatever goes on in the laboratory has little to do with actual students' learning science. There is usually limited planning and formulation of hypotheses, mostly done by the teachers. In many cases the experiments are derived from mostly irrelevant cultural settings with the attendant equipment disasters. The students follow a fixed program of practical work manipulations and goals/observations set by the teacher, cookbooks style. This research acknowledges the great role that well planned and delivered practical work in computer science can play in influencing students learning computer science and ICT in senior secondary school students in southeast Nigeria. For this to happen, practical work has to form a central part of classroom learning of computer science. Deliberate efforts have to be made to attract and retain the students into the computer class by appealing to the curiosity raising element and discovery component of practical work in the subject. Meaningful practical work is always embedded in a discussion of ideas that make it necessary to check observations and findings against, experiment and theory.

Statement to the Problem

Computer Science as one of the science subjects taught in Nigerian secondary schools is today unavoidably compulsory in its applications in all fields of study. This has been undergoing a crisis in students' enrolment in computer courses at all levels in many African countries especially among the female students. Reasons for this range from inadequate lower level preparation, weak mathematics background, fear of programming and hardware manipulation outside the teaching profession, inadequate teacher qualification as well as possession of below standard pedagogical content knowledge (Semela, 2010). Many students consider computer science as difficult, abstract and theoretical (House of Lords, 2006). Many students find the subject boring in programming development and hardware maintenance and unenjoyably in problem solving (Hirschfeld, 2012). Interest in senior school computer science is increasing and decreasing in abstract and logical thinking, learning motivation is declining, and the examination results are getting worse (Garwin &mRamsier, 2003; Manogue&Krane, 2003). In many school setting, little time is allotted for the subject compared to English language and mathematics,

which are other important subjects (Tesfaye & White, 2012; UNESCO, 2010).

The improvement on the students' performances in any subject in school is influenced by the students' interest towards that subject. Students appear to believe that the most problematic subject to study is computer science, though not because of its difficulty but as a result of poor perception and negative attitude towards the subject. A lot of problems have been associated with the study of computer science at secondary school level in the country as identified by Adeniran(2002), Onah and Ugwu (2010) and Gonteng (1998). These include:

Students' performances in senior secondary computer programming and hardware maintenance over the years have been very poor.

There are shortages of academic and professional computer teachers in our secondary schools, as well as shortages of resource materials for carrying out laboratory activities in computer science. Computer science study requires a lot of mathematics, programming, hardware guide and the students lack the basic mathematical, programming and hardware background.

With all these in view, it becomes very relevant to point out that practical work in senior secondary computer science study is not properly taught, and the expected objectives of teaching are not met.

Objective of the Study

Studies had been carried out on factors affecting quality and effective practical work in senior school sciences or applied science subjects. In most of these and other studies findings are made on the peculiarities of the associated environment and developments. Therefore, this study tries to:

- Identifying the institution-based factors affecting quality and effective practical work in senior secondary computer science study in South-East Nigeria,;
- Identifying the socioeconomic factors affecting quality and effective practical work in senior secondary computer science study in South-East Nigeria.
- To find out the extent of implementation of teachers educational trainings and uses of subject facilities and resources and
- To find out the extent of implementation of government's policy formulated on education;

Significance of the Study

The findings of this study will re-elevate the status of computer science as the fundamental science among students and other stakeholders in the educational and technological sectors of this zone in Nigeria.

The findings shall be of great benefit to the following people; education policy makers, teachers, students, curriculum planners and researchers. The designated members of staff of ministry of education and secondary education board that form education policy makers. The findings of this study will make the people develop and enforce appropriate policy directions which will ensure effective teaching of computer practical in secondary schools in the states. As well, the same policy can also be applied to other science subjects as this will go a long way in ensuring technological

advancement and sustainable development in the zone.

The findings of this study will help the computer science teachers in southeast zone of Nigeria to see the need for improvement in their delivery. This can be achieved through self-development and proper consultations by the teachers.

Curriculum Planners like Federal Ministry of Education, Nigerian Educational Research and Development Council (NERDC), West African Examination Council (WAEC) and National Examination Council (NECO) among others will use the findings of the study to identify areas of much attention so as to enhance students' performance in computer science and ICT development which will in turn culminate technological advancement.

Students offering computer science in the zone will benefit because it will lead to the employment of more qualified teachers and provision of more facilities which in turn lead to the acquisition of more skills, attitude and knowledge of the subject.

Scope of the study

The study focuses and is limited to finding the factors affecting quality and effective practical work in senior secondary computer science study. Focused was on the public senior secondary schools in southeast Nigeria.

Research questions

The following research questions guided the study:

What are the institutional factors affecting quality and effective practical work in senior secondary school computer science study in southeast Nigeria?

What are the socioeconomic factors affecting quality and effective practical work in senior secondary school computer science study in southeast Nigeria?

Hypothesis

The following null hypotheses were developed in the study and tested at 0.05 level of significance. They are:

$H0_1$: There is no significant difference in mean responses of teachers of computer science study from Ebonyi and Enugu states on the institutional factors affecting quality and effective practical work in senior secondary school computer studies in southeast Nigeria.

$H0_2$: There is no significant difference in mean responses of teachers of computer science study from Ebonyi and Enugu states on the socio-economic factors affecting quality and effective practical work in senior secondary school computer science studies in southeast Nigeria.

Research Methodology

Research Design

In this research design, descriptive survey will be adopted for the study. Descriptive survey design according to Nworgu (2006), is one in which a group of people is studied by collecting and analyzing

data from few people, considered to be representative of the entire group. The author further stated that questionnaire, test or interview could be used to collect data in survey design. The design was considered appropriate for this study because questionnaire was used to obtain data from students of computer science in the area of the study.

Area of the Study

The area of study is South East Nigeria. The South East Nigeria is made up five states of Ebonyi, Enugu, Abia, Anambra, and Imo. The states have countable senior secondary schools with the target of ensuring primarily access to quality secondary education by every child of school age.

Population of the Study

The population of the study is 1366. According to the official record from the Planning, Research and Statistics of the various secondary education boards' southeast states (2015) there are 129 of teachers of computer Science and ICT from Ebonyi, 324 from Enugu, 340 from Abia, 233 from Anambra and 351 from Imo.

Sample and Sampling Techniques

Multi-stage sampling techniques was used in the study. Initially, random sampling technique by balloting was used to draw a sample of two states, namely: Ebonyi and Enugu out of the five in the zone. Secondly, simple random sampling by balloting was used to select three educational zones from each state. The zones selected are; for Ebonyi: Abakaliki, Afikpo and Ezza South as well for Enugu: Udi, Nsukka and Agwu zones. Thirdly, simple random sampling technique was used to select 33 teachers of computer science study in each of the five zones while 35 were selected in the sixth zone, making a total of 200 respondents.

Instrument for Data Collection

The Instrument for data collection was a structured questionnaire called 'Computer Practical Work Questionnaire' (CPWQ). The questionnaire items was generated based on the information that was gathered from the respondents. The questionnaire was made up of two parts: part one solicited for information on the personal data of the respondents while part two was structured into two sections:

Cluster 1 = 15 items and Cluster 2 = 9 items.

Each questionnaire item is assigned a four point scale of: Strongly Agree (SA); Agree (A); Disagree (D); and Strongly Disagree (SD).

The responses are rated with their corresponding values as follows:

Strongly Agree	(SA)	= 4points;	Agree	(A)	= 3points
Disagree	(D)	= 2points;	Strongly Disagree	(SD)	= 1points

Validation of the Instrument

The instrument was validated by three (3) experts; one from Measurement and Evaluation, Ebonyi State College of Education, Ikwo, and the other two from the department of Science Education, University of Nigeria, Nsukka.

Reliability of Instrument
The Crombach's Alpha coefficient method will be used to determine the reliability of the instrument.

Method of Data Collection
The researcher involved ten research assistants from senior secondary schools within the two states selected for the study. These research assistants was trained to assist in the administration of the questionnaire to the teachers of computer science and ICT.

Method of Data Analysis
Data collected was analyzed using weighted mean and standard deviation to answer the two research questions and T-test to test the null hypotheses at 0.05 level of significant.

PRESENTATION AND ANALYSIS OF DATA

The analyzed data were organized based on the research questions developed and the null hypothesis formulation for the study.

Research Question 1
What are the institutional factors affecting quality and effective quality practical work in senior secondary school computer science study in South East Nigeria? Table 1 presents data from respondents from the research question.

Table 1: Mean responses of teachers of computer science study from Ebonyi and Enugu States' senior secondary schools on institutional factors affecting quality and effective practical work in senior secondary schools computer science study in South-East Nigeria.

(n) =200

SN	*Item Statement*	*SA*	*A*	*D*	*SD*	*Total*	*Mean (X)*	*Standard Deviation (SD)*	*Decision (D)*
1.	Non-availability of laboratory and equipment	672	66	12	4	754	3.77	1.0	Agree
2.	Inadequate laboratory materials	160	258	136	6	560	2.80	1.25	Agree
3.	Inadequate space for practical in laboratory	176	258	108	16	558	2.79	1.11	Agree
4.	Insufficient number of competent teachers	304	300	24	12	640	3.20	1.16	Agree
5.	Poor motivation of teachers	592	126	16	2	736	3.68	1.07	Agree
6.	Poor knowledge of practical	376	276	12	8	672	3,36	1.09	Agree

work content							
7. Insufficient time allotted to practical work	224	300	60	14	598	2.99	0.44 Agree
8. Lack of proper supervision	320	72	56	68	516	2.58	0.51 Agree
9. Poor teaching methods	200	330	62	6	598	3.01	0.62 Agree
10. Poor understanding of educational reform and its implementation by institution	304	264	64	4	636	3.18	0.99 Agree
11. Insufficient funds	656	72	16	4	748	3.74	1.04 Agree
12. Power supply failures	170	236	74	46	526	2.63	0.92 Agree
13. Lack of seriousness by the teachers and students	480	174	32	6	692	3.46	1.20 Agree
14. Lack of quality of textbooks and software	144	378	72	2	596	2.98	0.91 Agree
15. Inadequate exposure of teachers computer science study on the latest innovations in teaching and learning	312	264	32	18	626	3.13	1.02 Agree

Source: Researcher's Field Survey 2023

The presented data in table 1 above revealed that 15 items in the table had their mean values ranging from 2.50 to 3.77. This means that each of the mean values is above the cut-off point of 2.50, indicating that they are institutional factors affecting quality and effective practical work in senior secondary school computer science study in South-Eastern Nigeria.

The students deviate of the items ranging from 0.44 to 1.25. This means that each of the standard deviation is below 1.96. It therefore shows that the respondents were not too far from the mean and they were close to one another in their responses.

Research Question 2

What are the socio-economic factors affecting quality and effective quality practical work in senior secondary school computer science study in South East Nigeria? Table 2 presents data from respondents as well from the research question.

Table 2: Mean responses of teachers of computer science study from Ebonyi and Enugu States' senior secondary schools on socio-economic factors affecting quality and effective practical work in senior secondary schools computer science study in South-East Nigeria.

(n) =200

SN	*Item Statement*	*SA*	*A*	*D*	*SD*	*Total*	*Mean (X)*	*Standard Deviation (SD)*	*Decision (D)*
1.	Poor influence	256	348	40	0	644	3.22	0..95	Agree
2.	Poor knowledge of career prospect	552	114	32	8	706	3.53	1.19	Agree
3.	Poor educational foundation	128	264	48	24	464	2.96	1.27	Agree
4.	Poor mathematical knowledge	240	222	64	34	560	2.80	0.93	Agree
5.	Teacher-student relation	248	294	64	8	614	3.07	0.86	Agree
6.	Gender disparity	320	202	68	2	642	3.21	0.84	Agree
7.	Corruption on the part of relevant stakeholders	632	84	16	6	738	3.69	1.02	Agree
8.	Location of school	576	144	0	8	728	3.64	0.89	Agree
9.	Family inability and poverty	176	174	180	8	538	2.69	0.75	Agree

Source: Researcher's Field Survey 2023

Presentation in table 2 reveals that 9 items in the table had their mean values ranging from 2.69 to 3.81. This means that each of the mean values is above the cut-off point of 2.50, however indicating that they are socio-economic factors affecting quality and effective quality practical work in senior secondary school computer science study in South East Nigeria? The standard deviations of the items ranged from0.37 to 1.27. This means that each of the standard deviations is below 1.96, therefore shows that the respondents were not too far from the mean and they were close to one another in their responses.

Finding of Hypothesis

Hypothesis 1:

HO_1: There is no significant difference in the mean rating of the responses of teachers of computer science study from Ebonyi and Enugu states schools on the institutional factors affecting quality and effective practical work in senior secondary school computer science study in South-East Nigeria.

Data for testing the hypothesis are presented in table 3.

Table 3: T-test analysis of the responses of two groups respondents (teachers of computer science study from Ebonyi and Enugu States) senior secondary schools on institutional factors affecting quality and effective practical work in senior secondary schools computer science study in South-East Nigeria.

SN	*Item Statement*	*Computer Teachers (Ebonyi State) N = 100* X_1	S_1^2	*Computer Teachers (Enugu State) N = 100* X_2	S_2^2	*T-cal*	*T-tab*	*Remarks*
1.	Non-availability of significant laboratory and equipment	3.00	0.49	3.56	0.44	-1.59	1.96	Not
2.	Inadequate laboratory significant materials	3.10	0.66	3.46	0.50	-4.77	1.96	Not
3.	Inadequate space for significant practical in laboratory	3.74	0.97	3.14	0.95	-2.97	1.96	Not
4.	Insufficient number of significant competent teachers	3.71	0.46	3.69	0.46	0.40	1.96	Not
5.	Poor motivation of teachers significant	3.27	0.99	3.44	0.87	-1.96	1.96	Not
6.	Poor knowledge of practical significant work content	3.00	0.92	2.91	0.83	0.70	1.96	Not
7.	Insufficient time allotted to significant practical work	3.19	1.09	3.28	0.86	-0.70	1.96	Not
8.	Lack of proper supervision significant	2.66	1.08	3.06	0.72	-3.52	1.96	Not
9.	Poor teaching methods	3.59	0.50	3.40	0.49	-2.96	1.96	Not significant
10.	Poor understanding of significant educational reform and its implementation by institution	3.14	0.79	3.02	0.95	1.06	1.96	Not
11.	Insufficient funds significant	2.96	0.84	3.17	0.38	-2.86	1.96	Not
12.	Power supply failures significant	3.26	0.70	3.31	0.47	-0.33		Not
13.	Lack of seriousness by the	3.41	0.69	3.36	0.46	0.13	1.96	Not

significant teachers and students							
14. Lack of quality of	3.29	0.74	3.54	0.48	-2.80	1.96	Not
significant textbooks and software							
15. Inadequate exposure of	3.35	0.84	3.48	0.47	-1.60	1.96	Not
significant teachers computer science study on the latest innovations in teaching and learning							
df = 1.99							

Source: Researcher's Field Survey 2023

The data presented in table 3 above revealed that each of the 15 items in the table had a calculated t-value less than the table value of 1.96 (two tailed test) at 0.05 significance and 1.99 degree of freedom. This means that there was no significance difference in the mean rating of the responses of the two groups of respondents (teachers of computer science study at schools from Ebonyi and Enugu states) on institutional factors affecting quality and effective practical work in senior secondary school computer science study in South-East Nigeria.With this outcome, this result the null hypothesis of no significance difference were upheld for 15 items tested.

Hypothesis 2:

HO_2: There is no significant difference in the mean rating of the responses of teachers of computer science study from Ebonyi and Enugu states schools on the institutional factors affecting quality and effective practical work in senior secondary school computer science study in South-East Nigeria.

Data for testing the hypothesis are presented in table 4.

Table 4: T-test analysis of the responses of two groups of respondents (teachers of computer science study from Ebonyi and Enugu States) on socio-economic factors affecting quality and effective practical work in senior secondary schools computer science study in South-East Nigeria.

(n) =200

SN	***Item Statement***	***Computer Teachers (Ebonyi State) N = 100***		***Computer Teachers (Enugu State) N = 100***		***T-cal***	***T-tab***	***Remarks***
		X_1	S_1^2	X_2	S_2^2			
1.	Poor influence	3.33	0.78	3.48	0.65	-2.49	1.96	Not significant
2.	Poor knowledge of career prospect	3.25	0.77	3.50	0.59	-2.46	1.96	Not significant
3.	Poor educational foundation	3.42	0.78	3.51	0.56	-1.74	1.96	Not significant
4.	Poor mathematical	3.34	0.89	3.61	0.62	-4.10	1.96	Not

significant knowledge							
5. Teacher-student relation significant	3.34	0.67	3.42	0.61	-0.88	1.96	Not
6. Gender disparity significant	3.53	0.60	3.58	0.48	-1.59	1.96	Not
7. Corruption on the part of significant relevant stakeholders	3.55	0.64	3.68	0.45	-1.92	1.96	Not
8. Location of school significant	3.43	0.74	3.57	0.56	-1.92	1.96	Not
9. Family inability and poverty significant	3.23	0.62	3.80	0.37	-2.74	1.96	Not
df = 1.99							

Source: Researcher's Field Survey 2023

The data presented in table 4 above revealed that each of the items in the table had a calculated t-value less than the table value of 1.96 (two tailed test) at 0.05 significance and 1.99 degree of freedom. This shows indication that there was no significance difference in the mean ratings of the responses of the two groups of respondents (teachers of computer science study at schools from Ebonyi and Enugu states) on institutional factors affecting quality and effective practical work in senior secondary school computer science study in South-East Nigeria.

The result shows that the null hypothesis of no significance difference were upheld for 9 items tested.

Research Findings

The findings of the study in research question 1 show that all the items presented were all accepted as the institutional factors affecting quality and effective practical work in senior secondary school physics in South East Nigeria. The findings show that the institutional factors include: Non-availability of laboratory. and equipment, inadequate laboratory materials, inadequate space for practical in laboratory, insufficient number of competent teachers, poor motivation of teachers, poor knowledge of practical work content, insufficient time allotted to practical work, lack of proper supervision, poor teaching methods and poor understanding of educational reform and its implementation by institutions. Others include insufficient funds, power supply problem, lack of seriousness by teachers and students and lack of quality textbooks. The findings are in agreement with Jegede and Adebayo (2013), who discovered that the fundamental problems militating against the teaching and learning of computer studies in Nigeria included curriculum content, teaching methods, quality of teachers and negative attitudes of students. The findings also agree with Olufunke (2012), who discovered that science laboratory with adequate equipment was a critical variable in determining the quality of output from senior secondary school computer studies. The findings equally agree with the discoveries of Adeyemo (2012) and Onah and Ugwu (2010) whose findings indicate that teachers supply and laboratory facilities have strong and positive influence on students' achievement in senior secondary school computer studies.

The findings of the research question 2 shows that all the items presented were all accepted as the socio-economic factors affecting quality and effective practical work in senior secondary school computer studies in South East Nigeria. The findings include: Peer influence, poor knowledge of career prospect, poor educational foundation, poor mathematical knowledge and poor teacher-student relation. Others are, gender disparity, corruption on the part of relevant stakeholders, location of school and family instability and poverty. Mokoro, Aloka and Wambiya (2014) investigated the influence of some selected social factors on students' attitude towards science. Similarly, Kosgei, Mise, Odera and Ayugi (2013), studied the influence of teacher characteristics on-student academic attitudes and achievement, in selected secondary schools in Nandi South District, Kenya. The results revealed that as the level of education increased, the student performance and positive attitudes also increased. The result implied that teacher academic qualification influenced student's academic attitude and achievement.

The views, contributions and findings of the authors cited above justify the findings of the study.

Summary and Recommendations

Summary

Computer science study is a fundamental science that forms the basis for the development of technology, engineering and other allied areas of study. The level of overall development of any nation hinges on its scientific and technological advancement. As a subject, the objective of senior secondary school computer science study is to ensure that students develop interest in it and choose it as a profession or choose others professions which require computer study.

To make students progress in this subject and put the nation on a path of sustainable scientific and technological development, there is need to address the institutional and socio-economic factors identified in this study. Making contribution to this direction, the study notified the institutional and socio-economic factors affecting quality and effective practical work in the subject in senior secondary schools in South East Nigeria. This if addressed by relevant stakeholders could enhance a better understanding of the subject. The study therefore made the following contributions to knowledge:

i. It has provided information to the management of senior secondary schools at the various levels of government on the institutional and socio-economic factors that should be provided or enhanced in schools for a better study of computer science study.
ii. The study has provided information that could be used by non-governmental organizations and development partner agencies interested in provision of facilities for the implementation of science-based and ICT programs in our secondary schools. This is because they will use the findings to identify the various areas of attention and intervention;
iii. The study provided information which the different state governments in South East and other states in Nigeria will use to develop intensive workshop materials for training of teachers on improvisation in teaching and learning of computer study at senior secondary school level and
iv. The study also provided information which the school administrators and proprietors could use to solve problems affecting quality and effective practical work in computer science study.

Recommendations for Improvement

Based on the findings of the study, the following recommendations are made:

1) That the federal ministry of education in collaboration with the federal ministry of science and technology and other relevant agencies should address the identified factors so that science and technology would be its pride of place in the South East;
2) That different state governments in South East Nigeria should address the identified factors so that quality and effective teaching of computer science study practical would be ensured in the zone and
3) That Parent Teachers Association (PTA) of schools in South East Nigeria should be encouraged to contribute resources for the purchase of needed facilities for the teaching of computer science study practical.

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